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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,694	09/08/2005	Lars Metzger	10191/3598	9375

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EXAMINER	
AHMED, SHAMIM	
ART UNIT	**PAPER NUMBER**
1765	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/522,694	METZGER ET AL.	
	Examiner	Art Unit	
	Shamim Ahmed	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/27/05*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/27/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 24-26 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Regarding the claims 24-26, the phrase "HF/H2O gas" renders the claim indefinite because it is unclear whether the dry chemical etching is performed using a combination or at least one of the gases.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 11-12,15,18-19 and 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Jansen et al (WO 96/08036).

Jansen et al disclose a process for producing micro(electro) mechanical structures including the steps of:

- providing a silicon on insulator (SOI) structure having an insulation layer in between two silicon layers;
- Performing a first anisotropic etching using a first silicon etch gas to obtain a first trench in the first silicon layer that resemble as the claimed functional layer provided on the oxide layer to form a primary microstructure including trenches;
- Forming a passivating layer on the trench sidewalls;
- Etching the floor of the trench (figure 2C);
- Isotropic etching using a second silicon etch as to release the microstructure and resemble as the claimed etching a portion of the sacrificial layer below the microstructure (abstract, page 11, lines 2-22).

In the above disclosure, it is pointed out that etching the floor of the primary microstructure using the first silicon etch and beyond that to form second trench as claimed is simultaneous (see figure 2C).

As to claims 18-19, Jansen teaches the use of conventional silicon etching gas comprises NF3, CF4, etc. (col.7, lines 1-2).

As to claims 21-22, Jansen teaches the passivation is performed in the same reaction chamber in vacuum state with plasma (page 14, lines 12-14).

6. Claims 11-12,15,18-19 and 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by DE 19847 455 A.

In this rejection, in the absence of the translation of DE 19847 455 A, US patent Becker et al (7,052,623) is used as translation of the DE 19847 455 A.

Becker et al disclose a process for etching a SOI structure, wherein anisotropic etching a first silicon layer (15) through an etching mask to form trench (21) to expose underlying separating oxide layer (col.3, lines 44-64); forming a passivation layer (20) on the side wall of the trench; and performing a second etching at the bottom of the trench, wherein the second etch is anisotropic plasma etching process under strong ion bombardment, which resemble as the claimed physically directed etching (col.3, lines 65-col.4, lines 15);

Becker et al also disclose that performing an isotropic etching to penetrate through the second silicon layer (17) and releasing the free structure 32 (col.4, lines 52-55 and figures 1-3).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 13-14,16-17,20,23 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jansen et al (WO 96/08036) in view of Blanchard (2002/0066924) as supported with Kleinhenz et al (5,876,879).

As to claim 16, Jansen et al discusses above in the paragraph 5 but fail to explicitly teach the introduction of an additional layer on top of the functional layer.

However, Jansen et al teach that during the manufacturing of MEMS device, formation of anti-reflection coating layer or a thin metal film of chromium can be deposited on the silicon layer as to improves reflectivity (page 13, lines 24-32).

As to the claims 24-26, Jansen et al fail to teach removing the passivating layer and oxide layer left after the sacrificial layer etching.

However, Blanchard teaches oxide layer is etched or remove from the trench sidewalls using HF for resulting sidewalls having smooth as possible (paragraph 0027).

Blanchard fails to explicitly teach that HF etching is dry.

However, Kleinhenz teaches oxide is dry etch using hydrogen fluoride (HF) and also teach that dry etch is beneficial than the wet etching because wet etching leaves watermarks on the silicon substrate (col.2, lines 16-20 and col.5, liens 48-63).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Blanchard in view of Kleinhenz into Jansen et al's

etching process for efficiently forming a deep trench into silicon substrate as suggested Kleinhenz.

Conclusion

10. The prior art made of record listed in PTO-892 and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Shamim Ahmed
Primary Examiner
Art Unit 1765

SA
February 4, 2007